

We Claim:

- 1 1. A chemical vapor deposition system comprising: ✓
 - 2 a cleaning gas source configured to generate a reactive cleaning gas; and
 - 3 a chemical vapor deposition chamber including
 - 4 a processing gas shower,
 - 5 a cleaning gas distribution channel separate from the processing gas shower, and
 - 6 a plurality of cleaning gas injection ports fluidly connected to the cleaning gas
 - 7 distribution channel and disposed to introduce the cleaning gas into an
 - 8 interior of the chemical vapor deposition chamber.
- 1 2. The chemical vapor deposition system of claim 1, wherein the cleaning gas distribution
 - 2 channel and plurality of cleaning gas injection ports are disposed within a lid of the
 - 3 chemical vapor deposition chamber.
- 1 3. The chemical vapor deposition system of claim 1, wherein the cleaning gas source is
 - 2 configured to generate reactive fluorine species.
- 1 4. The chemical vapor deposition system of claim 1, wherein the cleaning gas source is
 - 2 configured to generate a reactive cleaning gas for cleaning byproducts of WSi_x film
 - 3 generation.
- 1 5. The chemical vapor deposition system of claim 1, wherein the plurality of cleaning gas
 - 2 injection ports include a first subset of the plurality of cleaning gas injection ports
 - 3 disposed at a first angle relative to side walls of the chemical vapor deposition chamber,

4 and a second subset of the plurality of cleaning gas injection ports disposed at a second
5 angle relative to the side walls.

1 6. The chemical vapor deposition system of claim 1, wherein the plurality of cleaning gas
2 injection ports are distributed along an interior rim of a lid of the chemical vapor
3 deposition chamber.

1 7. The chemical vapor deposition system of claim 1, further including internal plumbing
2 configured to transport the reactive cleaning gas to the cleaning gas distribution channel,
3 the internal plumbing being disposed within a wall of the chemical vapor deposition
4 chamber.

1 8. The chemical vapor deposition system of claim 1, further including a plurality of channel
2 openings configured for reactive cleaning gas to enter the cleaning gas distribution
3 channel.

1 9. The chemical vapor deposition system of claim 1, further including a chamber collar
2 configured to separate a lid of the chemical vapor deposition chamber from walls of the
3 chemical vapor deposition chamber, the chamber collar including internal plumbing
4 configured to supply reactive cleaning gas to the cleaning gas distribution channel.

1 10. The chemical vapor deposition system of claim 1, wherein the plurality of cleaning gas
2 injection ports are configured to deliver a greater concentration of reactive cleaning gases
3 to a cooler region of a chemical vapor deposition chamber than to a warmer region of the
4 chemical vapor deposition chamber.

1 11. A chemical vapor deposition chamber lid comprising:
2 a cleaning gas distribution channel disposed within a perimeter of the chemical vapor
3 deposition chamber lid and configured to circulate a reactive cleaning gas;
4 a plurality of cleaning gas injection ports configured to deliver the reactive cleaning gas
5 from the cleaning gas distribution channel to an interior of a chemical vapor
6 deposition chamber, the cleaning gas injection ports distributed around the
7 chemical vapor deposition chamber lid and configured to deliver a greater
8 concentration of the reactive cleaning gas to an upper region of the chemical
9 vapor deposition chamber than to a lower region of the chemical vapor deposition
10 chamber; and
11 internal plumbing configured to supply the reactive cleaning gas to the cleaning gas
12 distribution channel.

1 12. The chemical vapor deposition chamber lid of claim 11, further including a lid section
2 configured to support a processing gas shower, the processing gas shower being separate
3 from the cleaning gas distribution channel.

1 13. The chemical vapor deposition chamber lid of claim 11, further including a processing gas
2 shower separate from the internal plumbing.

1 14. The chemical vapor deposition chamber lid of claim 11, wherein the plurality of cleaning gas
2 injection ports include a first subset of the plurality of cleaning gas injection ports
3 disposed at a first angle relative to an edge of the chemical vapor deposition chamber lid,

4 and a second subset of the plurality of cleaning gas injection ports disposed at a second
5 angle relative to the edge.

1 15. The chemical vapor deposition chamber lid of claim 11, wherein the cleaning gas distribution
2 channel has a cross-section ten or more times greater than a cross-section of one of the
3 plurality of cleaning gas injection ports.

1 16. The chemical vapor deposition chamber lid of claim 11, wherein the plurality of cleaning gas
2 injection ports are configured to deliver a greater concentration of reactive cleaning gases
3 to a cooler region of a chemical vapor deposition chamber than to a warmer region of the
4 chemical vapor deposition chamber.

1 17. A method of cleaning a chemical vapor deposition chamber, the method comprising:
2 generating a reactive cleaning gas;
3 transporting the reactive cleaning gas to a cleaning gas distribution channel, the cleaning
4 gas distribution channel being separate from any processing gas shower head;
5 circulating the reactive cleaning gas around a perimeter of the lid;
6 passing the reactive cleaning gas into the interior of the chemical vapor deposition
7 chamber using a plurality of cleaning gas injection ports disposed in the lid; and
8 generating a desired concentration gradient of the reactive cleaning gas in the chemical
9 vapor deposition chamber.

1 18. The method of claim 17, wherein the reactive cleaning gas is passed into the interior of the
2 chemical vapor deposition chamber at a variety of angles responsive to angles of the
3 cleaning gas injection ports.

1 19. The method of claim 17, wherein the desired concentration gradient includes a greater
2 concentration near cooler elements within the chemical vapor deposition chamber than
3 near warmer elements.

1 20. The method of claim 17, wherein cleaning gas includes reactive fluorine species.

1 21. A chemical vapor deposition system comprising: /
2 means for transporting a reactive cleaning gas to a cleaning gas distribution channel
3 disposed in a lid of the chemical vapor deposition chamber;
4 means for circulating the reactive cleaning gas around a perimeter of the lid;
5 means for passing the reactive cleaning gas into the interior of the chemical vapor
6 deposition chamber; and
7 means for generating a desired concentration gradient of the reactive cleaning gas in the
8 chemical vapor deposition chamber, the desired concentration gradient including
9 a greater concentration near cooler elements within the chemical vapor deposition
10 chamber than near warmer elements.